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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/582,936
Filing Date: June 15, 2006
Appellant(s): MAEDA ET AL.

Penny Caudle
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 4th, 2009 appealing from the Office action mailed January 8th, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is not up to date. A correct statement of the status of the claims is as follows:

This appeal involves claims 1-10 and 14-15.

Claims 1-10 and 14-15 are rejected.

Claims 11-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: the rejections of claims 11-13 have been withdrawn.

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The rejections of claims 11-13 have been withdrawn.

(7) Claims Appendix

A substantially correct copy of appealed claims 1-10 and 14-15 appears on page 11 of the Appendix to the appellant's brief. However claims 7-13 presented in Appendix A are incorrect. Appellant's representative deleted the nomenclature in parenthesis in the set of claims filed 12/31/08. Examiner has attached the active set of claims submitted 12/31/08.

The minor errors are as follows:

Claim 7: (fsw) and (Esw(on)) deleted.

Claim 8: (Esw(on) – Esw / 2), (Psw) and (fsw) deleted.

Claim 9: (fsw) and (Esw(on)) deleted.

Claim 10: (Esw(on) – Esw / 2), (Psw) and (fsw) deleted.

(8) Evidence Relied Upon

6,550,290	Shimakage	10-2001
JP04-359890	Makino	12-1992

Toshiba International Corporation, Application Guideline 15, "Reliability Against Voltage and Current wrt ASD's", January 2, 2003, pages 1-3.

Mitsubishi Semiconductor Power Modules MOS, Application Note, Using Intelligent Power Modules, September 1998, pages 1- 31.

Examiner notes a translation of the Makino reference has been attached.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimakage (US 6,550,290) in view of Makino (JP 04-359890), Mitsubishi Application Note "Using Intelligent Power Modules" and further in view of Toshiba Application Guideline 15.

With respect to Claim 1, Shimakage discloses a current supply circuit (Fig. 5) applied with an AC voltage (Fig. 5 34 voltage) of a predetermined effective value [nominal line voltage] to output a polyphase AC current (Fig. 5 40a,40b,40c currents) to

a polyphase load (Fig. 5 17) of a predetermined rate power [motor sized for load] comprising a voltage doubler rectifying circuit (Fig. 5 29) and a polyphase inverter circuit (Fig. 5 37) including a series connection of two switching elements (Fig. 5 38a,b and 38c,d and 38e,f) for each phase (Fig. 5 phases 40a and 40b and 40c) and outputting said AC current of each phase from a node of each series connection (Fig. 5 40a and 40b and 40c). Shimakage does not disclose the voltage of the AC source.

Makino teaches doubling a 200Vac power supply (Fig. 1 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 200 V power supply. The reason for doing so was it was well known that a 200V power supply remains a standard voltage provided in Japan, as taught by Makino.

Furthermore, Shimakage does not disclose the breakdown voltage of the switching elements. The Mitsubishi Application Note teaches use of a 1200V module with the advantages of “higher reliablility, lower cost and reduced EMI”. It would have been obvious to one of ordinary skill in the art at the time of the invention to use 1200V transistor, such that said switching element is selected to have a second breakdown voltage [1200V], said second breakdown voltage being twice a first breakdown voltage required [565V nominal] of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage [voltage doubled and rectified to 565V nominal] is input to said polyphase inverter circuit, and said switching element is selected to produce almost the same turn-on losses [Fig. 6.34 P(W)] in a rated current value of said polyphase inverter circuit, said rated current value being obtained by dividing said rated power of said polyphase load by a voltage value being twice said

effective value voltage [Fig. 6.34 Vcc=600V] as said turn-on losses, as turn-on losses based on dynamic losses required in regard to said switching element and said switching frequency of said inverter. The reason for doing so was there were many known reasons for using a 1200 voltage transistor in a 400 volt application. It was well known to oversize the transistor to provide overvoltage protection. It was also well known that heating occurs as current squared, therefore for the same amount of power provided, by doubling the voltage the required current is halved and the current squared losses are reduced. It was also known to oversize transistors to extend the life and reliability of the product;

"In order to understand the significance of utilizing more expensive, 1700V rated IGBTs in 600V drives used in heavy duty, industrial applications, some basics need to be outlined.
First of all, the DC bus voltage is approximately equal to 2 x RMS AC input voltage. If the input voltage for example is 600V, the DC bus voltage becomes 848V. If the input voltage rises to 10% above nominal, i.e. 660V the DC bus voltage becomes 933V. If there are any transients on the line, the input voltage increases accordingly. When the drive slows the load down, the motor acts like a generator and transfers energy back to the drive further increasing the DC bus voltage. If a conventional 1200V PIV rated IGBT is used in a drive, it is apparent that the DC bus voltage can rapidly approach the PIV rating of the device.
Secondly, to make matters even more complex, reflected waves caused by the fast rise times of the IGBT interacting with the motor impedance and cable characteristics can cause additional over voltage stresses on the IGBTs …
Finally, if the DC bus trip voltage is set too close to the PIV rating of the IGBTs, they will be subjected to undue stress, which can easily lead to premature failure…
Transistors which are "oversized" can handle significantly more transient current before tripping and have additional thermal capability to prevent damage due to the transient I_2t heating during a fault condition. In short, larger output transistors translate into improved ability for a drive to accommodate overload stresses without damage or partial damage. This is a key feature of an industrial duty drive. Increased output transistor sizing provides increased reliable overload capability" (Toshiba Application Guideline #15, pages 1-2).

With respect to Claim 2, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein said AC voltage of said

predetermined effective voltage is a single phase (Shimakage Fig. 5 34), and said current supply circuit further comprises a voltage doubler rectifying circuit (Shimakage Fig. 5 29) on said AC voltage of said predetermined effective voltage to output a rectified voltage to said polyphase inverter circuit (Shimakage Fig. 5 37).

With respect to Claim 3, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein the inverter module is modularized as set forth above. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modularize the rectifier. The reason for doing so was to reduce the size and cost of the inverter electronics.

With respect to Claim 4, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein said polyphase inverter circuit (Shimakage Fig. 5 37) powers a polyphase motor (Shimakage Fig. 5 17). Shimakage does not disclose the rating for the motor. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 400V motor. The reason for doing so was to fully utilize the 400V voltage bus (Fig. 5 44).

With respect to Claim 5, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose

a method as set forth above wherein Shimakage discloses a method of designing a current supply circuit (Fig. 5) applied with an AC voltage (Fig. 5 34 voltage) of a predetermined effective value [nominal line voltage] to output a polyphase AC current (Fig. 5 40a,40b,40c currents) to a polyphase load (Fig. 5 17) of a predetermined rate power [motor sized for load] comprising a voltage doubler rectifying circuit (Fig. 5 29) and a polyphase inverter circuit (Fig. 5 37) including a series connection of two switching elements (Fig. 5 38a,b and 38c,d and 38e,f) for each phase (Fig. 5 phases 40a and 40b and 40c) and outputting said AC current of each phase from a node of each series connection (Fig. 5 40a and 40b and 40c) and setting a current value [inverter current to the load] as a rated current value of said polyphase inverter circuit, said current value being obtained by dividing said rated power of said polyphase load [power required by the load] by a voltage value [voltage provided to the load] being twice said effective value voltage [bus voltage of 44 is the AC input 34 doubled]. Shimakage does not disclose the voltage of the AC source.

Makino teaches doubling a 200Vac power supply (Fig. 1 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 200 V power supply. The reason for doing so was it was well known that a 200V power supply remains a standard voltage provided in Japan, as taught by Makino.

Furthermore, Shimakage does not disclose the breakdown voltage of the switching elements. The Mitsubishi Application Note teaches use of a 1200V module with the advantages of “higher reliablility, lower cost and reduced EMI”. It would have been obvious to one of ordinary skill in the art at the time of the invention to use 1200V

transistor, such that said switching element is selected to have a second breakdown voltage [1200V], said second breakdown voltage being twice a first breakdown voltage required [565V nominal] of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage [voltage doubled and rectified to 565V nominal] is input to said polyphase inverter circuit, and said switching element is selected to produce almost the same turn-on losses [Fig. 6.34 P(W)] in a rated current value of said polyphase inverter circuit, said rated current value being obtained by dividing said rated power of said polyphase load by a voltage value being twice said effective value voltage [Fig. 6.34 Vcc=600V] as said turn-on losses, as turn-on losses based on dynamic losses required in regard to said switching element and said switching frequency of said inverter. The reason for doing so was there were many known reasons for using a 1200 voltage transistor in a 400 volt application. It was well known to oversize the transistor to provide overvoltage protection. It was also well known that heating occurs as current squared, therefore for the same amount of power provided, by doubling the voltage the required current is halved and the current squared losses are reduced. It was also known to oversize transistors to extend the life and reliability of the product;

"In order to understand the significance of utilizing more expensive, 1700V rated IGBTs in 600V drives used in heavy duty, industrial applications, some basics need to be outlined.
First of all, the DC bus voltage is approximately equal to 2 x RMS AC input voltage. If the input voltage for example is 600V, the DC bus voltage becomes 848V. If the input voltage rises to 10% above nominal, i.e. 660V the DC bus voltage becomes 933V. If there are any transients on the line, the input voltage increases accordingly. When the drive slows the load down, the motor acts like a generator and transfers energy back to the drive further increasing the DC bus voltage. If a conventional 1200V PIV rated IGBT is used in a drive, it is apparent that the DC bus voltage can rapidly approach the PIV rating of the device.
Secondly, to make matters even more complex, reflected waves caused by the fast rise times of

the IGBT interacting with the motor impedance and cable characteristics can cause additional over voltage stresses on the IGBTs …
Finally, if the DC bus trip voltage is set too close to the PIV rating of the IGBTs, they will be subjected to undue stress, which can easily lead to premature failure…
Transistors which are "oversized" can handle significantly more transient current before tripping and have additional thermal capability to prevent damage due to the transient I_2t heating during a fault condition. In short, larger output transistors translate into improved ability for a drive to accommodate overload stresses without damage or partial damage. This is a key feature of an industrial duty drive. Increased output transistor sizing provides increased reliable overload capability" (Toshiba Application Guideline #15, pages 1-2).

With respect to Claim 6, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the method as set forth above wherein said AC voltage of said predetermined effective voltage is a single phase (Shimakage Fig. 5 34), and said current supply circuit further comprises a voltage doubler rectifying circuit (Shimakage Fig. 5 29) on said AC voltage of said predetermined effective voltage to output a rectified voltage to said polyphase inverter circuit (Shimakage Fig. 5 37).

With respect to Claim 7, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above wherein as the switching frequency increases the switching element is selected in a range of low turn-on losses at least since the switching elements are switched on quickly.

With respect to Claim 8, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, wherein Shimakage remains silent as to the switching

losses. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the turn on losses and breakdown voltage. Optimization of losses or breakdown voltage through routine experimentation is typically not patentable. See MPEP 2144.05 II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck

& Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claims 9-10, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above. See claims 7 and 8, respectively, for additional details.

With respect to Claim 14, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, wherein the predetermined effective voltage is 200 V and the first breakdown voltage is 600 V.

With respect to Claim 15, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, wherein the switching element is an IGBT.

(10) Response to Argument

Preliminary Statements

Examiner considers Appellant's Figure 7 and Figure 12 to be the most relevant figures of the claimed invention, as well as sheet 3, lines 6-10, sheet 6, lines 6-24 and sheet 11 lines 19-25 to be the most pertinent portions of the specification.

Examiner notes original claim 1 filed 6/15/06 claimed the invention in terms of the input voltage of 200 V_{ac} and actual breakdown voltage of 1200 V_{dc} and the disputed claim language “first breakdown voltage” and “second breakdown voltage” was added in the amendment filed 10/9/08. Support for the amended claim language “first breakdown voltage” and “second breakdown voltage” exists in original claim 5.

Summary of References

Shimakage teaches the known topology of voltage doubling an AC input voltage to provide a DC bus voltage to an inverter.

The Toshiba application note teaches how to select the breakdown voltage of a switching element in an inverter.

Makino teaches 200 V_{ac} was a standard supply voltage.

The Mitsubishi Application notes teach 1200 V_{dc} was a standard breakdown voltage for a switching element.

Examiner notes a large number of references (four) were used in the obviousness rejection of claim 1 and would like to clarify why all four references were maintained in the final rejection of 1/8/09, as opposed to using only Shimakage in view of the teaching of the motivation in the Toshiba application note. The additional references of Makino and the Mitsubishi Application note were provided to demonstrate the implementation may be performed in a standard topology with standard parts and standard supply voltages.

Background Information

Before proceeding to the Argument's by Appellant's Representative it may be helpful to review to review some basic power conversion terminology, particularly in relation to the conversion from AC to DC voltage. When reviewing the claimed invention and the subsequent rejections it is essential to realize whether an AC voltage or DC voltage is referred to when a voltage is mentioned. Utilities typically provide power in the form of an AC sinusoidal voltage which has a peak value of the square root of 2 times the root-mean-square (rms) value. When a sinusoidal AC voltage is rectified to a DC voltage, the DC voltage or peak voltage will be $\sqrt{2}$ multiplied by the AC voltage, not including the small loss of the rectifier. Therefore the rectified DC voltage is approximately 1.41 times the AC sinusoidal voltage. Examiner notes the conventional rectified DC voltage need not be expressed exactly as 1.41 times the AC voltage, for instance a conventional 110 V_{ac} line may be conventionally referred to simply as 160 V_{dc}, rather than 155.1 V_{dc}. Finally, the breakdown voltage of a part is expressed as a DC voltage.

Claim Interpretation

Examiner notes Appellant's representative and Examiner have contended the claim language of 'a first breakdown voltage required of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage is input to said polyphase inverter circuit'.

Examiner interprets the first breakdown voltage to be a definition of a DC voltage value for a topology with or without a voltage doubler in which the inverter receives the voltage value from the rectifier. Appellant's Prior Art Figure 12 depicts a topology without a voltage doubler, at which a breakdown voltage value of the switching elements of a polyphase inverter (Figure 12 41), would be selected when a DC voltage (Figure 12 V_{dc}) is obtained by performing full-wave rectification (Figure 12 21) on the AC input voltage (Figure 12 1). Appellant's embodiment of the invention in Figure 7 depicts a topology with a voltage doubler, at which a breakdown voltage value of the switching elements of a polyphase inverter (Figure 7 42), would be selected when a DC voltage (Figure 7 V_{dc}) is obtained by performing full-wave rectification (Figure 7 22) with voltage doubling (Fig. 7 22) on the AC input voltage (Figure 7 1).

Examiner points out the definition of the first breakdown voltage is for a voltage value obtained by the rectified AC input voltage and resulting DC voltage whether or not a voltage doubler is implemented. The definition of the first breakdown voltage is structured such that the full-wave rectification voltage is input to the polyphase inverter circuit. When no voltage doubler is implemented the full-wave rectification voltage is input to the polyphase inverter circuit. When the voltage doubler is implemented, the voltage doubled full-wave rectification voltage is input to the polyphase inverter circuit.

Examiner further notes the first breakdown voltage is the definition for a hypothetical voltage value which is not implemented. The first breakdown voltage value is a definition of a voltage value used to determined the second breakdown voltage

value. No components are implemented according to the first breakdown voltage value. Components are sized according to the second breakdown voltage value.

Examiner has interpreted the claim language in light of the specification and insists the rejection is entirely consistent with and analogous to Appellant's specification. Appellant's specification on sheet 3, lines 6-10, sheet 6, lines 6-24 and sheet 11 lines 19-25 provide examples of the first breakdown voltage. Examiner further notes a broadest reasonable interpretation of the disputed claim language has not been relied upon, although a broadest reasonable interpretation would further substantiate the rejection of the claimed invention, because additional rejections would be available under a broadest reasonable interpretation.

Examiner would consider the claim language to be clearer if the claim language recited use of a voltage doubler as depicted in Figures 7 or 8 and claimed in Claim 2, but acknowledges Appellant may choose their own claim language.

Deficiencies in Arguments by Appellant's Representative

Appellant's representative argues the rejection does not meet the claim limitation of a second breakdown voltage being twice a first breakdown voltage required of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage is input to said polyphase inverter circuit. However, the rejection utilizes a first breakdown voltage value equal to a voltage value of a full-wave rectification of the AC input voltage and sets the second breakdown voltage equal to twice the first breakdown voltage value. In the rejection, the first breakdown voltage value is nominally

600 V_{dc} from the voltage doubled 200Vac input voltage and the second breakdown voltage is set to 1200 V_{dc}. Clearly the second breakdown voltage is twice the first breakdown voltage.

Appellant’s representative argues the prior art does not satisfy 'the required breakdown voltage'. No where in the claim is the language ‘the required breakdown voltage’ stated. Examiner interprets the argued ‘required breakdown voltage’ to refer to the first breakdown voltage. Appellant’s representative never points out what the required breakdown voltage is in Appellant’s invention or how the required breakdown voltage would differ from the cited prior art. Examiner maintains the cited prior art has the same required breakdown voltage as Appellant’s proposed invention and meets all claim limitations.

Appellant’s representative has misrepresented the teaching of the Toshiba reference. Appellant states "as noted by Toshiba due to various factors the required breakdown voltage could easily exceed 1200V". Toshiba does not assert the voltage could easily exceed 1200V. Instead Toshiba describes the voltage could exceed 933 volts if the input voltage went 10% high. Appellant’s representative continues to ignore the teaching of Toshiba and jumps to the conclusion the Toshiba reference would have to teach a 2400V breakdown.

The arguments of Appellant’s representative regarding Toshiba having to teach a 2400V breakdown voltage lack support in the disclosure for such an interpretation of the claims. If the same arguments Appellant’s representative applied to Toshiba were applied to Appellant’s disclosure, a different voltage value for the second breakdown

voltage would be selected than the actual value of the disclosed breakdown voltage. By applying the arguments of Appellant's representative to Appellant's disclosure in Figure 7, for a 200 V_{ac} input voltage doubled to 564 V_{dc}, a required breakdown voltage value of 850 V_{dc} would be chosen, which would have to be doubled to the second breakdown voltage of 1700 V_{dc}. The second breakdown voltage of 1700 V_{dc} is much higher than the 1200 V_{dc} breakdown voltage actually disclosed by the Appellant. The arguments of Appellant's representative clearly lead to selecting the wrong second breakdown voltage.

There are further problems with the arguments set forth by Appellant's representative regarding the Toshiba reference. Appellant's representative has argued arbitrarily selecting a required breakdown voltage which must be doubled to form the second breakdown voltage. Since the required breakdown voltage as argued could vary from one application or one designer to another there could be no clear bounds for the second breakdown voltage. If weight were given to the arguments of Appellant's representative, the second breakdown voltage would be arbitrarily variable on any safety factor and the claim would be indefinite. Since the claim explicitly defines the first breakdown voltage as being the value of the full-wave rectification input to the inverter that is how the claim language of the first breakdown voltage should be interpreted.

A table summarizing the prior art, invention and arguments of Appellant's representative are provided below.

Table 1

Item	Topology	Input (Vac)	Effective Voltage (Vac)	DC Voltage (Vdc)	Nominal DC Voltage (Vdc)	First Breakdown Voltage (Vdc)	Second Breakdown Voltage (Vdc)	Motor Voltage (Vac)	Rated Current	SF
1	AAPA	200	200	282	300	300	600	200	P/200	2
2	Application	200	200	564	600	600	1200	400	P/400	2
3	103 Rejection	200	200	564	600	600	1200	400	P/400	2
4	Toshiba	600	600	848	850	850	1700	600	P/600	2
5	Toshiba Prior Art	600	600	848	850	850	1200	600	P/600	1.5
6	Toshiba as Argued	600	600	848	850	1200	2400	600	P/600	3
7	Invention as Argued	200	200	564	600	850	1700	400	P/400	3

The results for the seven scenarios are summarized in Table 1. The final column lists the nominal safety factor used for the switching elements in the given topology. Appellant's admitted prior art, disclosure of the invention and the teaching of the Toshiba application note all disclosed using the same safety factor. The conventional safety factor disclosed in the Toshiba Application note used in the prior art used a lower safety factor. The arguments as made by Appellant's representative propose a higher safety factor which lacks support in the disclosure.

Row 1 summarizes Appellant's admitted prior art depicted in Figure 12.

Row 2 summarizes Appellant's claimed invention, such as depicted in Figure 7.

Row 3 summarizes the rejection under Shimakage in view of Makino, Toshiba and Mitsubishi.

Row 4 summarizes the teaching of the Toshiba application note.

Row 5 summarizes the prior art referred to in the Toshiba application note.

Row 6 summarizes the arguments made by Appellant's Representative regarding the Toshiba application note.

Row 7 summarizes what the values for the claimed invention would be for a topology as shown in Figure 7, if the arguments made by Appellant's Representative were applied to the claimed invention.

Appellant's representative further argues Examiner has misinterpreted the breakdown voltage as being twice the AC input voltage instead of twice the first breakdown voltage. Again, the claim language does not recite the terminology of 'the breakdown voltage'. Examiner interprets the arguments of Appellant's representative reference to 'the breakdown voltage' to mean the claimed second breakdown voltage. The rejection relies on the second breakdown voltage of 1200 V_{dc} being twice the first breakdown voltage of 600 V_{dc}, the second breakdown voltage being nominally four times the 200 V_{ac} input voltage (282 volts peak). Clearly the rejection does not rely on the second breakdown voltage being twice the input voltage since the second breakdown voltage (1200 V_{dc}) is four times the nominal input voltage (300 V_{dc}).

Furthermore, even if such a relationship as the second breakdown voltage being twice the input voltage did exist, the second breakdown voltage happening to be twice the input voltage can not prohibit a rejection, since the claim language does not prohibit the second breakdown voltage from being twice the input voltage. The claim language instead requires the second breakdown voltage to be twice the first breakdown voltage, which is fully met by the rejection.

The rejection meets the claim limitation of setting the second breakdown voltage to twice the first breakdown voltage and any relation of the second breakdown voltage value to the input voltage value does not prohibit, contradict or detract from the second breakdown voltage meeting the claim limitation of being twice the first breakdown voltage.

Appellant's representative argues the cited prior art does not teach selecting said switching element having a second breakdown based on said rated current value, said second breakdown voltage being twice the first breakdown voltage. On the contrary, the second breakdown voltage is selected based on the rated current value since the voltage to the inverter is derived from the power to the load divide by the rated current. As already explained above, the second breakdown voltage is chosen to be twice the first breakdown voltage.

Appellant's representative argues the remaining dependent claims are allowable for the reasons presented above. However, the arguments have been found deficient for the reasons stated above and the rejections of the dependent claims have been maintained.

Summary of Response to Argument

Appellant's representative has argued the cited prior art does not teach selecting said switching element having a second breakdown voltage twice the first breakdown voltage. However the second breakdown voltage of 1200 Vdc is clearly twice the first breakdown voltage of 600 Vdc. As detailed above and evidenced by contrasting rows 2 and 3 in Table 1, the obviousness rejection relies on a known topology with a standard

input voltage and standard component values and interprets the claim language in the same way as Appellant's disclosure.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Harry R Behm/

Examiner, Art Unit 2838

Conferees:

/Harry R Behm/

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Quality Assurance Specialist, TC 2800